NOVEMBER 1, 1961

GAS IN INDUSTRY

Supplement to the "GAS JOURNAL"

Vol. 4 No. 42

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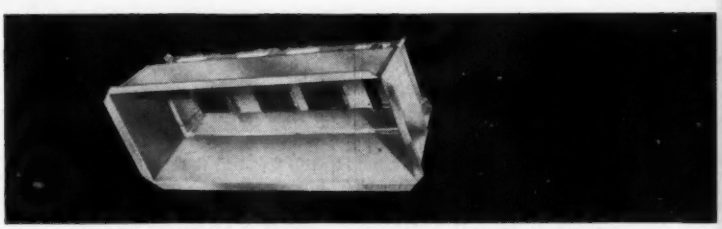

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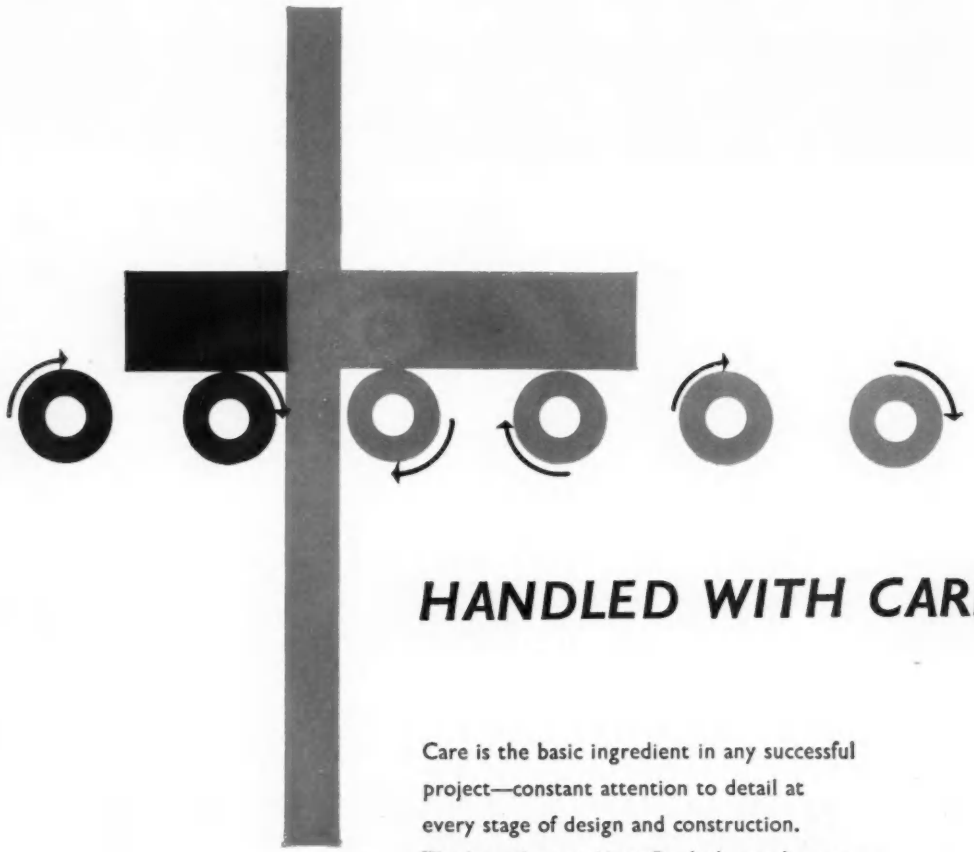

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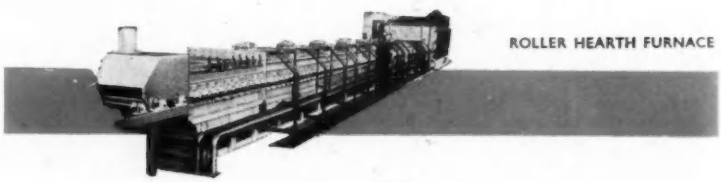

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GAS IN INDUSTRY

NOVEMBER 1961

Vol. 4 No. 42

FEATURES

AC-DELCO GIVE GAS A BIG PLUG
By Eric Ford.

NORTH WESTERN BOARD SHOWS HOW GAS MAY BE USED TO SERVE INDUSTRY.

FUEL AND POWER FOR INDUSTRY EXHIBITION.

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Two exhibitions in the North

WE think it is significant that two exhibitions with a similar theme should have recently run concurrently in the North of England.

Opening on successive days, the Industrial Equipment Exhibition at the City Hall in Manchester and the Northern Exhibition of Fuel and Power for Industry at the Queen's Hall in Leeds, were both able to stress the savings possible in fuel consumption and the added flexibility and adaptability of gas as an industrial fuel.

Since the war and especially since nationalisation, the gas industry has made great strides in successfully developing the use of town gas in a very large number of industries both by supplying a suitable fuel and providing an efficient service to its customers. It is notable that the industrial gas engineer, though willing to do so, is loath to adapt existing heat treatment appliances to burn gas. He prefers to design and install special equipment which will use gas as efficiently and economically as possible, and these exhibitions, especially that at Manchester, illustrated this particular point.

Within the last few years, the gas boards in the southern and eastern parts of the country have collaborated in holding exhibitions in London at which firms representing a remarkably varied cross section of manufacturing and processing industry have exhibited special plant designed for them by the industrial gas engineers of the respective boards. We have in mind the 'Gas at Work in Industry' exhibition held some 18 months ago at the Royal Horticultural Hall, Westminster, which was later sponsored by the North Eastern Gas Board and also held at Leeds.

Clearly interest in such plant has grown since then, and the North Western Gas Board's contribution to the Industrial Equipment Exhibition at the City Hall was a significant indication of this, so also was the opening of the exhibition by Sir Henry Jones, Chairman of the Gas Council. In co-operation with 44 industrial firms, this Board was able to illustrate either with actual pieces of plant or when this was impossible because of its weight and bulk by representing the appliance pictorially. Wherever possible plant was shown 'alive,' carrying out its particular function and attended by a craftsman. At the same time the Board's industrial gas engineers were at hand to answer questions and give information.

That the consumption of gas by industries in the North West has increased by 50% in the last 10 years and now represents 35% of the Board's sales is also indicative of the way gas carries out its job, especially when it is realised that its commodity price may be higher than other refined fuels. Clearly it is the additional advantages that go with it that help to overcome what at first sight must appear as a stumbling block to both industrialist and engineer.

Specially designed plant not only burns the minimum quantity of gas as efficiently as possible, but provides a means of more even heating than considered possible hitherto. The increasingly heavy duty imposed on industry to abolish smoke emission over ever widening areas might be something of a burden, if it were not for gas-fired plant being able to cut down the number of rejects and sub-standard products and so pay for its installation in a remarkably short time.

Much of the success of many of Britain's leading industries is due to the manufacturers of the specialist components which are incorporated in most complex products. In many cases these are not made by the firm which produces the final article. This is particularly true of the motor car industry which procures many of the most important components from the well-known specialist firms serving the motor vehicle manufacturer.

A good example is the firm of AC-Delco (a Division of General Motors) which, at its Dunstable works, produces a wide range of components for the automobile industry, including sparking plugs, ignition coils, small electric motors, distributors, windscreen wipers, various switches and horns.

Many of the processes used in the manufacture of these components involve the use of heat in various forms and gas is widely used by AC-Delco for this purpose. The gas load which is supplied by the Watford Division of the Eastern Gas Board amounts to about 38 mill. cu.ft. per annum.

About 2,300 workpeople are employed at the AC-Delco plant which occupies a site area of 22 acres with a floor space of 356,000 sq.ft. The plant itself is well laid-out and operations proceed in a smooth flow, using production line techniques where these are possible.

This ingenious piece of equipment is used for applying glaze and a trade mark to the sparking plug insulators. After printing, the plugs are dried by a gas burner, on the right of the picture.

A MOTOR vehicle can be immobilised by the failure of any one of a number of the specialist components it contains and for this reason the manufacturers of these parts pay the closest attention to the development, design and manufacture of vital accessories. The sparking plug is perhaps one of the most important of these, and AC-Delco have long been known as the manufacturers of reliable sparking plugs.

Their current product, the AC 'Hot Tip' range, was introduced only a couple of years ago, following three years' intensive development work and the expenditure of over £250,000 on plant, machinery and new building construction.

Sparking plug production comprises, essentially, the manufacture of the insulator, the production of a metal shell and the assembly of these, with other smaller components, into the final product.

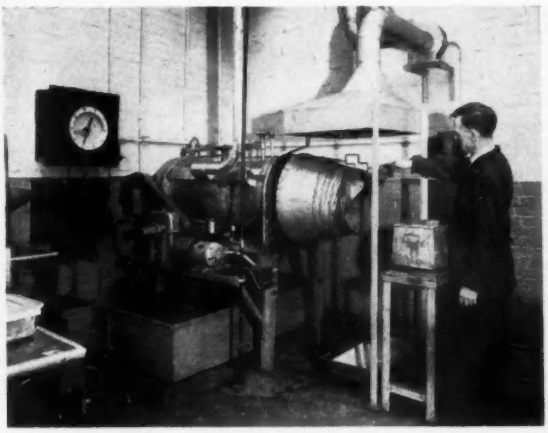
The production and assembly of AC-Delco 'Hot Tip' plugs is organised on flow process lines.

Insulators for sparking plugs are made from aluminium oxide which has been previously processed to the rigid AC-Delco specification and is received at the Dunstable plant in sealed containers to prevent pollution during movement.

This material first passes through a series of grinding processes to bring it down to fine powder.

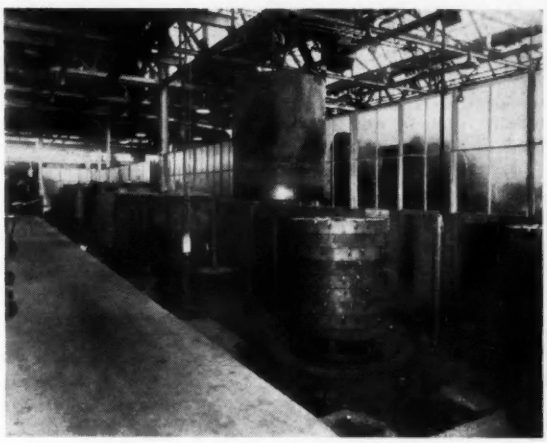
By means of the addition of water, the powder is turned into a slurry and pumped to the top of a 40-ft. spray drying tower. The tower and all the other equipment associated with the process is sited in an impressive, well-lit building.

This company values the happy relationship which exists with the Eastern Gas Board .... annual consumption is about 38 mill. cu.ft. .... so it is really true to say—



Gaskets for insertion in AC-Delco sparking plugs are annealed in this gas-fired rotary furnace.

AC-DELCO give gas a big plug



General view of the battery of inner and outer 'top hat' furnaces. The method of charging the furnaces and handling the 'top hat' is clearly shown.

The ignition coil department, showing the indirect gas-fired oven in which the coils are brought up to temperature for filling with oil.

By
ERIC FORD

At the top of the tower, the slurry is screened and fed to a distributor bowl where it is flung out by centrifugal force in the form of a fine spray. This atomising process leaves the material in the form of tiny droplets which are allowed to fall through a whirling cyclone of hot air.

The moisture is dried out, leaving a dry moulding powder, comprising tiny globules too small to be distinguished by the naked eye.

When fed into moulds and pressed, the granulate assumes the form of the insulator and at this stage it is pressed firm enough to be fed on to suitable grinding heads for finishing.

Insulators are then placed in containers (known as 'saggars') for firing in a special kiln, in the course of which certain physical and chemical changes take place. The insulator emerges as a tough ceramic, about one-fifth its original size.

For the final operation before assembly begins, the insulators are glazed and the trade mark and type number printed on them. This is done on an ingenious piece of rotary spray equipment which employs a small air/gas burner as the heating medium.

The insulators are loaded on to this revolving mechanism which, as it moves on its circular path, takes the insulators successively through a cleaning spirit, past the device which automatically prints on the trade mark and number, past the gas burner which dries the printing ink and through a spray which applies a thin coating of glaze.

Assembly

Now the assembly of this section of the plug begins. The lower electrode is inserted, a mixture of glass and copper powder is applied and compacted by the exclusive 'Conductaseal' process and the upper electrode is then placed in the insulator.

By passing through a suitable furnace, the sealing mixture is melted and, after leaving this furnace, the top electrode is pressed into the seal. During passage through the furnace the glaze has been vitrified.

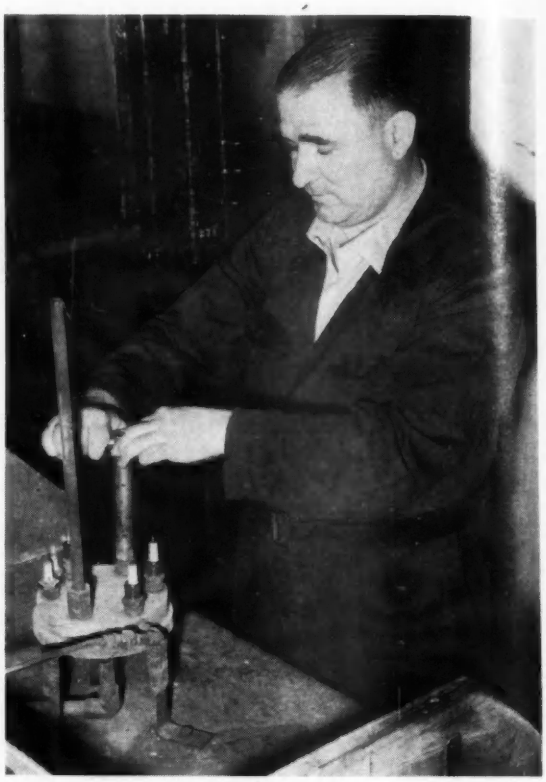
This completes the assembly of the insulator, which is now subjected to a 40,000 volt electrical insulation test to reveal the slightest flaw.

Meanwhile, the metallic portions of the sparking plugs (the shells) have been produced on automatic machines which carry out all machining operations except thread rolling.

This is done on special purpose machines after the side electrodes have been welded into place.

SPECIAL HEAT TEST

Discerning motorists appreciate the reliability of the AC-Delco 'Hot Tip' sparking plug, shown here undergoing special heat test.



A chemical blacking process, which reacts on the carbon content of the steel, gives the plug shells rust resistance.

Shells and insulators now meet up for final assembly, which includes the well-known AC 'Cico' sealing process. Great heat and pressure are used to collapse the shell on to the top and bottom gaskets, ensuring a gas-tight seal.

Top and bottom gaskets are annealed in gas-fired furnaces. Bottom sealing gaskets are annealed in 'top hat' furnaces to regularise their condition, while the top sealing gaskets are annealed in a special gas-fired rotary furnace to soften them and aid the completion of the sealing procedures on assembly.

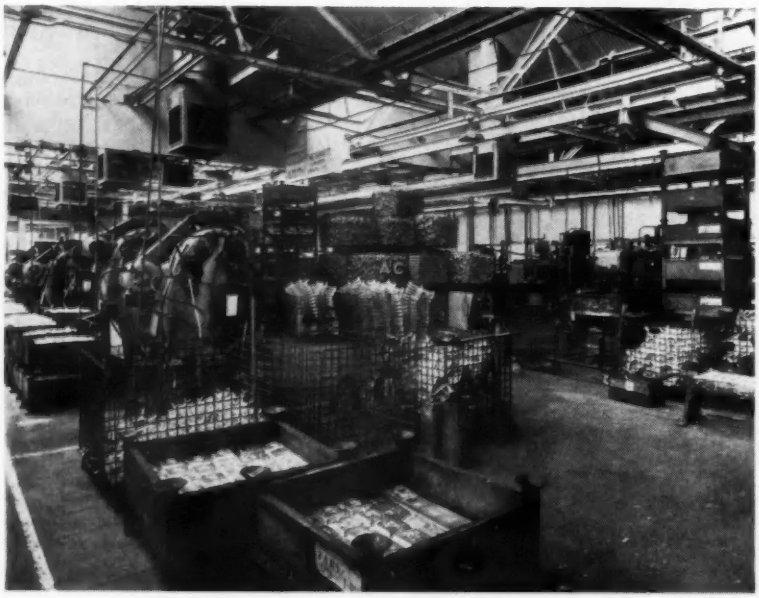
This rotary furnace is of the revolving drum type, which gives the gaskets what can best be described as a 'partly bright annealed' treatment.

Loaded into hopper

The gaskets are loaded into a hopper, whence they enter the drum and later drop into a water quench. The operating temperature is about 560°C.

After assembly, the plugs are gap-set, washed, dried and cooled to ambient temperature before being subjected to further stringent tests and packed in readiness for dispatch.

Gas is used by AC-Delco for annealing the stators which are incor-



General view of the die-casting shop, showing ingots ready for the machines, waste metal (or 'sprues') and finished components.

pointed in the fractional horsepower electrical motors produced by the Company.

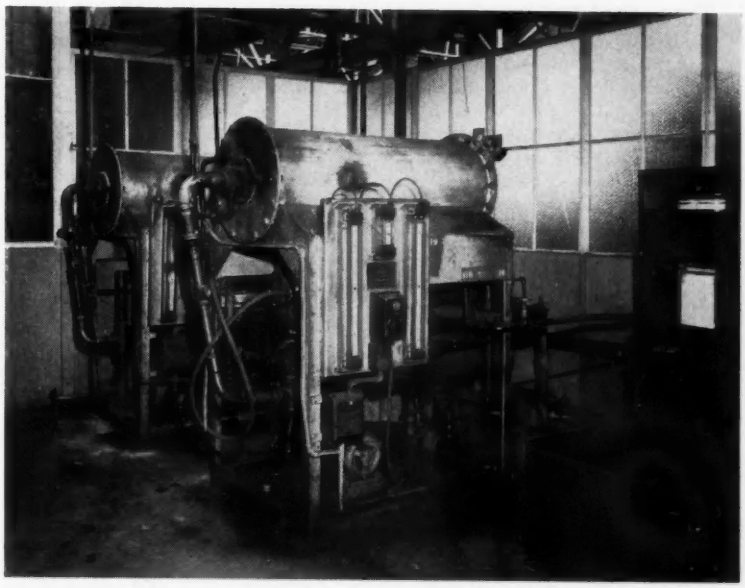
An annealing process is used on these stators for two main reasons. In the first place, the stators are composed of a number of special steel laminations which are guillotined and then loosely rivetted together to form blocks of various thicknesses, according to requirements.

Heat treatment

The heat treatment softens the hardened guillotined edges of the laminations in order to give the desired electrical properties. The second object of the annealing process is to produce a blue-grey oxide film which provides insulation for the laminations.

Annealing of stators is carried out in a battery of eight inner and outer 'top hat' furnaces which, as the name implies, consist of inverted circular columns, sealed at one end, resembling a top hat without the brim.

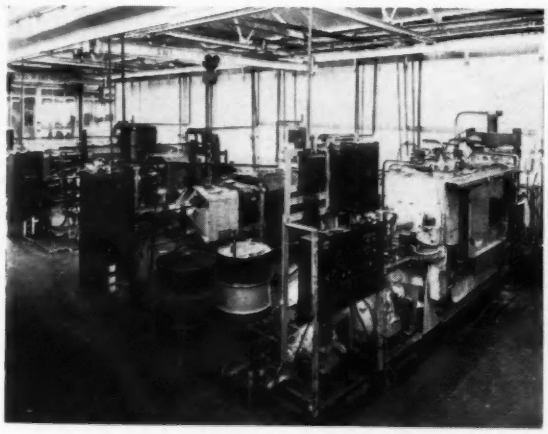
The inner 'top hat' can be raised and lowered on to the furnace bed as required by a system of overhead pulleys.



In these generators the atmosphere is produced for the 'top hat' furnaces.

The outer 'top hat' is similar in shape, but larger, so that is can be lowered into position over the inner 'top hat,' leaving an annular space between the two. The furnaces were supplied by Incandescent Heat Ltd.

A suitable atmosphere is provided by Incandescent Exothermic generators, with an output of 500 cu.ft. per hour. The generators use air and town gas in the ratio 3½:1, the air being drawn through a filter into the burner. The product gas is pumped out through condenser tubes for cooling and, via a water trap, to the 'top hat' furnaces.



Some of the die-casting machines used by AC-Delco for fabricating a variety of components. Gas is used with these machines.

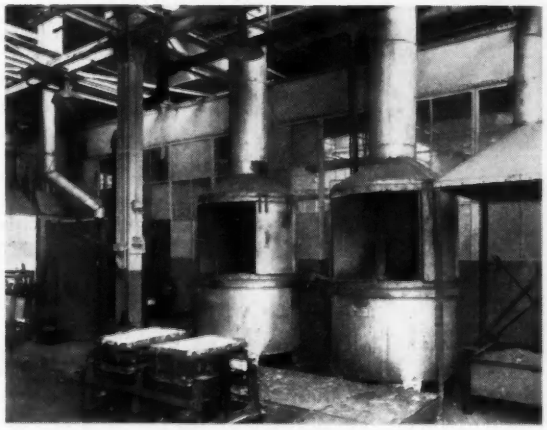
'Top hats' lifted

To load the furnaces with work, both the 'top hats' are lifted to the raised position and a number of stators, from about 120 to 330 per furnace, according to the size of stators, are packed on the floor of the furnace.

The inner 'top hat' is then lowered over the work and effectively sealed in the sand on the bed of the furnace. The outer 'top hat' is then lowered over this.

It is important that the inner 'top hat' is completely purged with atmosphere gas before lighting the furnace burners, which use town gas compressed to about 4 p.s.i. through high-pressure injectors.

Each load is brought up to about 800°F. and kept at this temperature for an annealing time of 1¼ hours. Temperature control is achieved



Die-cast cuppings and sprues are re-melted in these furnaces.

though thermocouples sited between the stacks of stators.

At the end of this period, the gas supply is turned off and the work allowed to cool to 600° F., both the inner and outer 'top hats' being kept in place throughout this period.

On reaching this temperature, the supply of atmosphere gas is cut off and the outer 'top hat' lifted. The temperature of the load continues to fall until it reaches 350°F., when the inner 'top hat' is lifted and the load exposed to atmosphere and oxidation takes place. The load is removed when cool enough to handle.

Intricate operations

Some very intricate operations are required in the manufacture of ignition coils at AC-Delco, there being as much as 4½ miles of wire in each coil.

At a later stage of ignition coil manufacture, the case has to be filled with oil for insulation and cooling purposes. This oil-filling procedure is effected under vacuum, and it is necessary that the coils should be at the same heat as the oil when this operation takes place.

Accordingly, the coils are heated to about 260°F. in a gas-fired oven. The oven which, of course, is indirect-fired, is sited above the workshop floor and the coils are loaded at floor level on to suitable hooks on a moving belt and taken up into the oven, where they pass to and fro on the endless belt through the heating chamber.

After an appropriate period, which enables them to reach the required temperature, the coils leave the oven, still on the moving chain, and are immediately filled with oil under vacuum.

Here, as thoughout the AC-Delco works, great attention is paid to testing and inspection procedures. A particularly ingenious piece of test equipment is used to inspect the ignition coils, rejecting any which may be found to be faulty.

Some of the smaller components required for such items as distributors are given suitable heat treatment in the AC-Delco heat treatment shop.

This contains a variety of gas-fired equipment to meet all demands made upon it. One of the most useful pieces of equipment is a rotary furnace, used for various duties, including the gas carburising of small items.

In this furnace, a suitable carbon hardening compound is used in appropriate quantities, and the action of the furnace ensures that the components being treated are kept continually on the move.

Furnace temperature

The four gas burners are used to keep the furnace at a temperature in the range 850-900°C., temperature control being effected through a pyrometer and by adjusting the number of burners to maintain the desired temperature rate.

Facilities for quenching by water, oil or brine are available as required.

Other gas-fired equipment in this heat treatment shop includes a shaker hearth furnace, for which the atmosphere can be supplied from a small endothermic generator in the department. This is also fired by town gas. Carbo-nitriding can also be carried out in this department if desired.

Elsewhere in the AC-Delco works there is a section devoted to plating, including the zinc plating of certain components, such as windscreen wiper linkage arms, instrument bezels and various other small items.

Hot water heater

Gas finds some applications here as, for example, in heating the hot water tank for washing plated components. Two bar burners on this tank give the required temperature of about 300°F. A gas-fired oven for drying purposes is also in use in this section.

Die-casting in Mazak is carried out in another department which turns out such items as car horns and cases for various components. Scrap metal (such as the 'sprues' from previous castings) is melted down in gas-fired pots of 1,200 lb. capacity and then cast into ingots.

This metal has a melting point of about 800°F.

Die-casting machines of standard design are used in this work, and components of very good quality and finish were seen to emerge from this department.

All the gas-fired equipment so far described is employed on process work in the actual manufacture of the AC-Delco range of products.

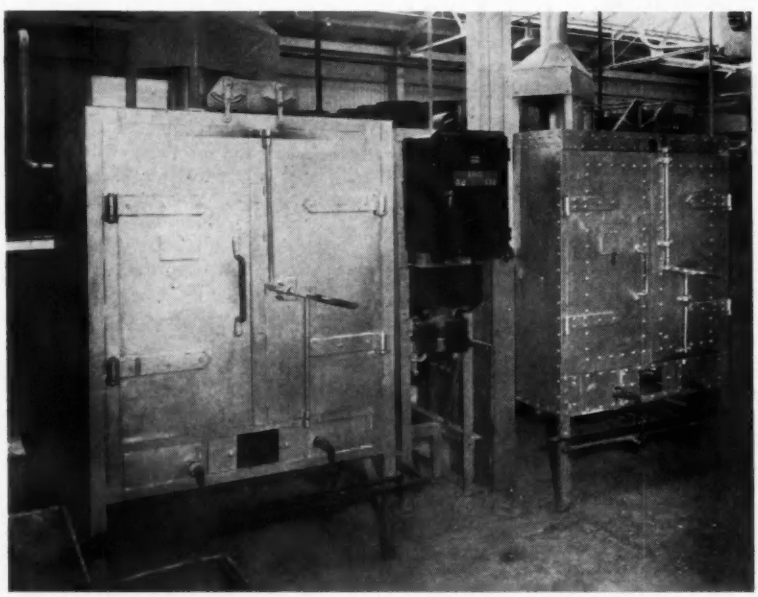
Gas also has a part to play in the continual experimental work which the Company carries out in pursuance of its policy of research and development. This equipment includes two small Brayshaw furnaces, both gas-fired, used for high temperature experimental work.

Gas-fired kitchen

The kitchen is entirely gas-fired, with numerous ovens, deep-fryers and other equipment.

AC-Delco make the best use of the large amount of gas they consume, both in process and other work. Moreover, a representative of Company management was at pains to point out that the firm values the happy relationship which exists between the Company and the Eastern Gas Board.

While it is always gratifying to hear the gas industry referred to in these terms it is all the more satisfactory when the comment comes from a Company whose products bear the well-known name of AC-Delco.



A large variety of gas-fired equipment is in use at AC-Delco, including these two general purpose furnaces.

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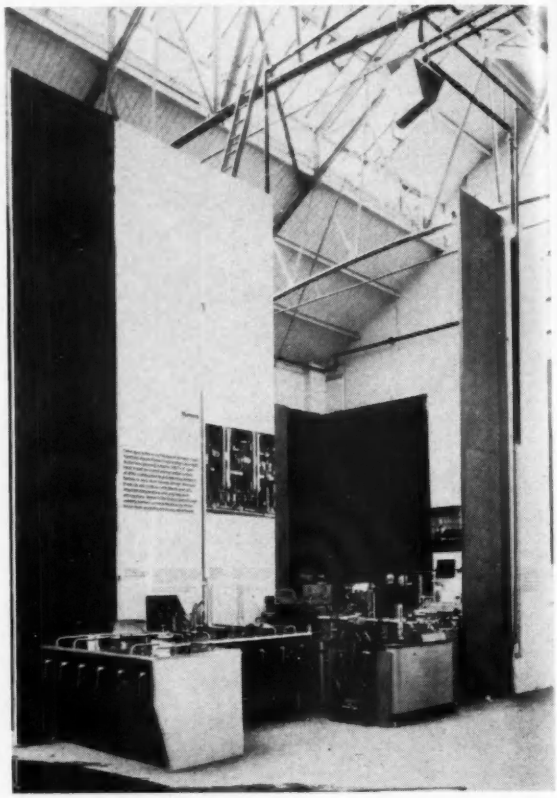
North Western Board shows how gas may be used to serve industry

44 FIRMS CO-OPERATE IN EQUIPMENT EXHIBITION



A corner of a North Western Gas Board stand at the Manchester Industrial Equipment Exhibition. Exhibits were presented to tell how gas is used to help industrial productivity.

THE largest collection of gas-fired industrial installations ever to be housed under one roof in the north-west has been on view in the Byrom Hall—part of Manchester's City Hall. Using the theme 'Gas in the Service of Industry,' the North Western Gas Board participated in the recent Industrial Equipment Exhibition with the co-operation of 44 industrial firms from all over the United Kingdom. These firms loaned gas-fired equipment which was on show and demonstrated throughout the Exhibition.

Their installations were presented in nine different sections, namely: 1, Heat treatment of metal. 2, Metal melting. 3, Hot working of metals. 4, Glass working. 5, Burners. 6, Product finishing. 7, Space heating. 8, Textiles. 9, Food.

For new processes

There was also a special section presenting the work the gas industry in the north-west—supported by the Gas Council's two research stations at Fulham and Solihull—is doing to develop special gas-fired appliances for new industrial processes.

Although the wide array of equipment on show was claimed to be the most comprehensive ever exhibited publicly, it only gave a broad glimpse of the ever-growing and manifold uses of gas in industry.

To try to bridge this gap, accordingly, 30 other firms, besides those who loaned equipment were represented pictorially in this exhibition.

To make clear what function each exhibit fulfilled a dramatic technique in presentation was employed in the form of groups of 20 ft. by 3 ft. screens, which acted as a setting, and explained the exhibits graphically and in story form.

International designers were employed to give unity to the presentation, and as a result the Board's part of the total exhibition was as interesting to the general public as to the industrialists.

Many of the exhibits were 'live' and shown under actual working conditions, with craftsmen from the firms concerned in charge.

Colour films

In addition there were daily talks in the lecture theatre to explain the purpose and scope of the installations exhibited. The talks were followed by colour films produced by the Gas Council, which demonstrated the principal ways in which gas is being utilised by the great industrial concerns throughout the country.

It is worthy of note that 35% of the Board's total output of gas is now being sold for industrial uses, and sales are growing every year. Over the past ten years they have increased by more than 50%.

Sir Henry Jones, Chairman of the Gas Council, who opened the complete exhibition, referred to the vital and extensive services given to the country's industries by gas.

Revolutionary design

Sir Henry said that the North Western Gas Board was showing some developments which would help modern industry in new techniques; but the size of the plant used in many processes was such that it could not be shown at the exhibition. Hence the photographs. They believed the range of appliances exhibited would interest most industrial firms. Some were revolutionary in design and would merit close study.

The stand attendants were all technical men, who gave advice on any heating application. They were all members of the Board's team which had been set up to provide, free, a first class fuel technology service. All parts of the area were covered by these men.

Reasons for the growth in gas sales to industry included controllability; it fitted well into continuous production lines; there was constant quality, resulting in better products and less rejects; speed of heating; and greater efficiency in use.

In the development section it was emphasised that the gas boards were prepared to help in solving manufacturing problems involving heat.

The West Midlands Gas Board has developed a multi-passage kiln, a model of which was on show.

An important feature is that all ware is fired at the same temperature, thus virtually eliminating rejects. Both maintenance and fuel costs are very low. This appliance is made by Gibbons Bros., Ltd., of Dudley, and W. J. Jenkins, Ltd., of Retford.

Rapid melting furnaces

A revolutionary development by the North Eastern Gas Board is an A.C.R.M. rapid melting furnace which was shown operating, for the rapid melting of non-ferrous metals. Phosphor bronze can be melted at the rate of 100 lb. in eight minutes. Metal loss is much reduced, being only about half that normally encountered and all this is achieved with lower melting costs for fuel.

There was a mould drying unit, the Axial Jet-M portable hot air unit, developed by the North Western Gas Board, which dries moulds more cleanly, quickly and evenly than the old coke braziers.

The unit, easily portable and operated by push button, can be obtained from Modern Furnaces & Stoves, Ltd., Booth Street, Handsworth, Birmingham, 21.

Without a furnace

It is often difficult, if not impossible, to stress-relieve large welded vessels in a furnace. The North Eastern Gas Board has devised a system, obtainable from Clayton, Son & Co., Ltd., of Leeds, enabling this work to be carried out to British Standard conditions, without using a furnace.

A model of the equipment shows the principle of high speed recirculation of hot gases clearly.

The North Western Gas Board has designed a range of packaged air heaters, one of which was shown, for application to ovens or process heaters. Simple to install, the units are entirely automatic and very economical in operation. High speed recirculation is employed which results in rapid heating-up, even temperature conditions and speedier drying.

To facilitate the conversion of solid fuel type central heating boilers to gas firing, a forced draught packaged burner unit, in various sizes, has also been developed.

This fully automatic plant has proved in practice to be highly efficient, since the design prevents the ingress of cold air during periods of shut down.

Foundry use

In the metal melting section it was made clear that gas is extensively used in the foundry for core and mould drying, cupola lighting, hot blast for cupolas, smoke incineration, curing of shell moulds and the drying and firing of moulds for investment castings.

It is also invaluable for galvanising, tinning, lead and type-metal melting because of the ease of control and uniformity of heating.

A new type of furnace produced in various sizes by Thermic Equipment and Engineering Co., Ltd., of Salmon Street, Preston (a 200 lb. capacity model of which was shown) is very quiet and efficient due to its burner design.

Even temperature

Tangential firing at high speed results in even temperature and longer crucible life. Combustion air is drawn through an annular casing with consequent cool operating conditions.

This furnace is claimed to be particularly suitable for melting and holding of aluminium and other non-ferrous metals.

The firm of G. L. Scott & Co., Ltd., Ellesmere Port, manufacture laminations for electric motors. On the stand, they demonstrated the centrifugal casting of small rotors, using the above bale-out furnace.

On ladle drying it was possible only to show a small unit. This was one of a range made by Thermic Equipment and Engineering Co., Ltd.

Not only does gas carry out this work smokelessly, but also the soft flame used ensures even temperature rise.

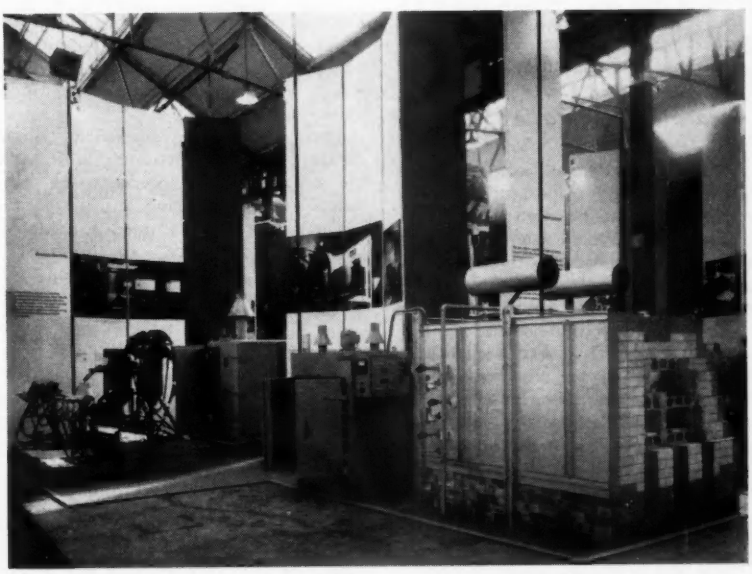
For automatic cutting and profiling, town gas is the ideal fuel. Not only does it give a cleaner cut, which can eliminate subsequent machinery operations, but it also avoids the trouble of handling and storage of fuel gas bottles.

Now automatic

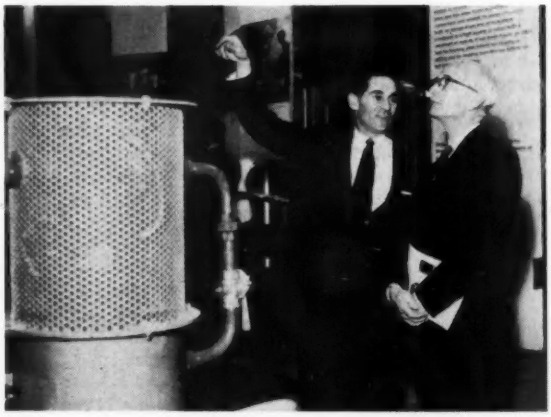
Hancock & Co., Ltd., of Progress Way, Croydon, operated one of their Hancomaster machines. They make other models with a wide range of controls.

For many years, gas has been the standard fuel for brazing, but recent developments have enabled this to be done automatically. The unit shown, by Standard Telephones and Cables, Ltd., of Sidcup, Kent, can be fitted directly into a production line; it can also be used for soldering, annealing and hardening.

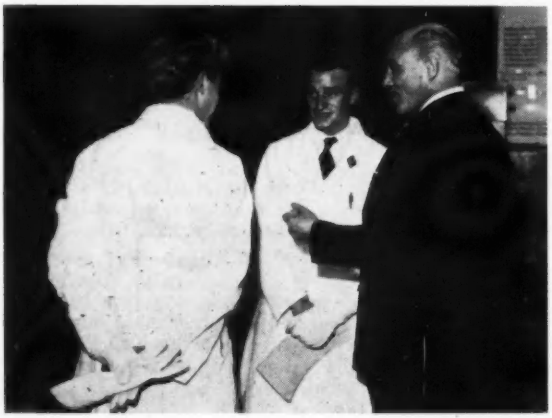
Demonstrating the above equipment, Stoves, Ltd., of Rainhill, who



Another corner of the Exhibition in the Byrom Hall, Manchester.



Mr. G. Robertshaw (left), Manchester Group Development Engineer explains the workings of the 'Axialjet' air heater to Sir Henry Jones, Chairman of the Gas Council.



Mr. D. P. Welman, Chairman of the North Western Gas Board, talks to Mr. Keith Rhodes and Mr. George Holmes (facing camera), Manchester Group Industrial Engineers.

manufacture domestic appliances, were brazing cooker parts and showing examples of the various processes in which this versatile equipment helps on their production lines.

The heat treatment section set out to show that for annealing, normalising, stress relieving, hardening, case hardening and carburising, town gas is used in vast quantities.

Accurate temperature

The precise control which it gives allows accurate temperature and atmosphere conditions in the furnace. Special atmospheres can be prepared which enable heat treatment to be carried out in a clean condition or to replace constituents which have been removed in previous operations.

The examples shown were necessarily limited in size but typified the versatility of gas. Some recent furnaces are very large; one being built at the moment for stress relieving is 15 ft. square and 105 ft. long. Town gas is to be the heating medium.

In flame hardening plain carbon steels can be given a hard coating by the application of an intensely hot oxy-coal gas flame followed by a rapid quench. This avoids the need for using special steels in many cases and has the further advantage of preserving the tough core as well as allowing localised treatment.

Time and labour are saved and costs reduced. Surfard, Ltd., of Abford House, 15, Wilton Road, London, S.W.1, have produced a series of completely automatic machines using this technique, one of which was demonstrated for the spin hardening of gears.

Their Milliscope automatic temperature control accurately adjusted the process, giving precisely the required depth of casing.

There was an example of a high-temperature furnace, an appliance suitable for heat treatment up to 1,200°C., by Marlow-Whitney, Ltd., of Neasden, London, N.W.10.

For clean annealing

Illustrating the type of plant which can be used for clean annealing, hardening or brazing, for sintering or pottery decoration was a continuous wire mesh belt furnace by Dowson and Mason, Ltd., Alma Works, Levenshulme, Manchester.

This furnace comprised a preheating, firing and cooling section. The high temperature section, which works at temperatures up to 1,000° C., is of heat resisting muffle construction.

It was shown with an endothermic generator feeding a reducing atmosphere into the plant to ensure scale-free processing.

For temperatures of up to 550°C., with a temperature variation of not more than ±2°C. throughout the working space, an oven was shown by J.L.S. Engineering Co., Ltd., of Brook Street, Redditch.

Other models can be supplied for temperature ranges of up to 850°C. These ovens are particularly suitable for tempering or stress relieving of steel, annealing, solution treatment or age hardening of aluminium alloys, core and mould drying, paint stoving and many other drying or curing processes.

Explosion reliefs

It was fitted with explosion reliefs which make it particularly suitable for treating materials which give off inflammable vapours. During the exhibition this oven was being used for annealing laboratory glassware.

A high speed steel hardening furnace by Brayshaw Furnaces, Ltd., Belle Vue Works, Manchester, 12 was shown.

The firm has recently produced a new twin chambered furnace for the hardening of high speed steels at temperatures between 1,200 and 1,400° C. This furnace uses gas at normal pressure, and pressure air is supplied by a fan mounted within the casing.

Working temperature is attained within 90 minutes of starting from cold. Two sizes are available, one with chamber dimensions of 7 in. by 9 in. by 4 in. high and the other 9 in. by 12 in. by 5 in. high. The former was on show.

Product finishing

The variety of processes for which gas is used in product finishing is enormous, and only a few of the most modern developments were featured.

Paint can be dried on thin metal in a matter of minutes by using gas-fired infra-red panels. For heavier sections, it is sometimes better to employ forced convection ovens, which are generally of larger size.

Both these methods are suitable for continuous production, and Acme Stamping, Ltd., of Churnett Street, Manchester, 9, demonstrated the spray painting and drying of household articles made by them using a spray booth and conveyorised radiant

drying tunnel manufactured by Parkinson Cowan Industrial Products, of Fitzalan Street, London, S.E.11.

Small floor area was taken up for the quantity of products processed.

Polythene provides an attractive finish on metal articles, being also highly resistant to corrosion and having very good insulating properties. The ease with which this coating can be applied was shown by the Telegraph Construction and Maintenance Co., Ltd., of Farnborough, Kent, manufacturers of the Dipkota unit, which comprises a fluidised bed of powdered polythene.

Vitreous enamelling

A complete coating plant was operating, consisting of a preheating tunnel made by Bratt Colbran, Ltd., of Wembley, then the Dipkota unit and finally a curing tunnel, manufactured by Parkinson Cowan Industrial Products.

It was seen that this process lends itself to line production, particularly of wire fabricated articles.

For many years gas has been the standard fuel for vitreous enamelling. Recent development of the Jetube furnace by the Incandescent Heat Co., Ltd., of Smethwick, has further improved the service gas can offer; it gives higher efficiency, quicker heating and more even temperature conditions.

Most furnaces of this type are large structures, but a small one, incorporating its own drying oven, has been made and is ideal for small ware.

One of these was used by Cowen & Sons, of Hampton Street, Birkenhead, for vitreous enamelling house name plates.

Attractive oven

Attractive in appearance, as well as efficient in operation, is the 'New Style' natural convection oven made by F. J. Ballard & Co., Ltd., of Tipton, Staffs. The model shown was double cased and direct fired, but the firm also make a treble cased oven in which products of combustion are excluded from the working space.

The heating of liquids can be a very inefficient process and it is well worthwhile to insulate all exposed surfaces. Even higher efficiency can be achieved by firing into tubes immersed in the liquid, and a good example of this type of appliance was offered by Dowson and Mason, Ltd., of Levenshulme, Manchester, 19. It is designed for degreasing, oil heating and for the heating of chemical solutions.

Flame spraying equipment was shown by F. W. Berk & Co., Ltd., of Trafford Park Road, Manchester, as well as pistols designed for spraying powdered metal through a gas flame.

This spray-fuse can be used with many metals—zinc, aluminium, nickel and cobalt alloys for instance. It gives excellent adhesion to the parent metal, with a very smooth finish.

Town gas is the perfect fuel for this process, as well as the cheapest.

For forging or hot working of metals the ease of temperature and atmosphere control makes gas the perfect fuel.

Mansil Booth & Co., Ltd., who are about to open a works in St. Helens, demonstrated hot brass stamping. Billets were heated in a conveyorised gas fired furnace fitted with thermostatic control and delivered to a Taylor and Challen press for stamping.

Industrial Furnaces, Ltd., of Kingswinford, Staffs., showed a new recuperative slot forge furnace which is suitable for all types of small forging processes requiring temperatures up to 1,500°C.

It had a built-in recuperator with stainless steel tubes giving long life and reduced fuel cost.

Glassware

About one eighth of all the gas sold to industry by the North Western Gas Board is used in the manufacture of glass and glassware. Glassmaking plant is mostly very large and cannot be shown in an exhibition.

However one of the purposes for which gas is used is for making laboratory glassware, and J. W. Towers & Co., Ltd., of Widnes, provided one of their craftsmen to perform this delicate and intricate work. A small muffle furnace, made by Selas Gas and Engineering Co., Ltd., of City Road, Manchester, 1, was used for annealing the smaller fabrications.

Gas can be burnt in four main ways:

(*a*) Neat, giving a luminous flame.
(*b*) With the addition of part of the combustion and before burning to give a blue aerated or bunsen flame.
(*c*) Pressuring either or both the gas and combustion air to increase the combustion intensity. Furnace atmospheres can be accurately controlled.
(*d*) Enclosing the burner in a refractory tunnel, within which combustion is completed. Very high rates of heat output can be obtained in this way.

Within these classifications, a wide variety of designs make it possible to cater for every requirement. The choice of the correct burner for any particular application is one which needs the expert advice which the Gas Board is able to offer.

A selection of burners had been built up and all could be operated. The following is a list of those which were shown:—

Non-aerated or neat burners: Aeromatic Co., Ltd., Uxbridge; Geo. Bray & Co., Ltd., Leeds.

Aerated or Bunsen burners: Aeromatic Co., Ltd., Uxbridge; Amal Ltd., Birmingham; Dowson & Mason, Ltd., Manchester; Keith Blackman, Ltd., Tottenham; Selas Gas & Engineering Co., Ltd., Manchester.

Pressure burners: Keith Blackman Ltd., Tottenham; Chance Bros., Ltd., Smethwick; Dowson & Mason, Ltd., Manchester; Selas Gas & Engineering Co., Ltd., Manchester; Thermic Equipment & Engineering Co., Ltd., Preston; A. H. Wilkes & Co., Ltd., Birmingham; W.S.A. Engineering Co., Ltd., London.

Tunnel burners: Barlow-Whitney, Ltd., London; Thermic Equipment & Engineering Co., Ltd., Preston.

For a long time gas has been the choice of the chef as the premium fuel for cooking. Not only is it used by all the leading hotels and restaurants, but vast quantities are used for prepared foods — biscuits, confectionery, bread, breakfast, cereals, ham boiling, sugar boiling, coffee roasting, banana ripening, and potato crisps. Photographs of some of these applications were in the hall.

For the industrial canteen, there is a big range of appliances, of which only four were shown because of space limitations. They were:

Mayfair cooking range and griller by Radiation (Large Scale Cooking), Ltd., Warrington. Hot cupboard and cafe set by J. Stott & Co. (Engineers), Ltd., Oldham.

Factory heating

The provision of an adequate temperature within a factory is just as important as having the right machines —both will improve productivity.

Gas can cater for all types of buildings, using overhead radiant heaters for the lofty workshops, directing heat just where needed, hot air unit heaters for lower buildings and conventional central heating or balanced flue radiators for offices.

Samples of these heaters were available for inspection and automatic operation.

Overhead radiant heaters: Satellite W.1 and S.4 models, Bratt Colbran, Ltd., Lancelot Road, Wembley. W.M.10.A and HS.30 models, Harris Engineering Co., Ltd., Browning Street, London, S.E.17. Parkinson Schwank WM.2X and H3 models, Parkinson-

Cowan Industrial Products, Fitzalan Street, London, S.E.11. Mastertherm W.2 and S.2 models, Radiant Heating, Ltd., Barnsbury Park, London, N.1.

The following were selected from a large range of sizes and types—

Unit air heaters: Indirect model 505 wall or suspended mounting, Harris Engineering Co., Ltd. Indirect model VG100, freestanding, Harris Engineering Co., Ltd. Indirect freestanding, Waterbury, Ltd., 16, Upper Grosvenor Street, London, W.1.

Balanced flue heaters: Drugasar model 950 JBN, supplied by F. A. Borchardt, Ltd., 506, High Road, Chiswick, W.4. Aristocrat model No. 30, made by Matthew Swain & Co., Ltd., Newton Heath, Manchester, 10.

Central heating boilers: Elite, Ideal Boilers & Radiators, Ltd., Hull. Diplomat, Thos. Potterton & Co., Ltd., Warwick.

Smokeless ignition

In the industrial field, many processes emit smoke and gas can often help to eliminate this. For instance, the smokeless ignition of foundry cupolas and similar plant is easily and cheaply achieved. The North Western Gas Board's technical service is freely available to help in solving these problems.

The destruction of combustible trade wastes is another difficulty which can usually be overcome by using properly designed incinerators incorporating means for the prevention of smoke emission. Examples of these were shown.

Clean air

On the clean air stand were—B.200 Hoskinson incinerator, Boston Marine & General Manufacturing Co., Ltd., Wolverhampton. C.T.1 incinerator, Dowson & Mason, Ltd., Levenshulme, Manchester. Victor incinerator, Victor Products (Wallsend), Ltd., Wallsend-on-Tyne. Lighting poker for solid fuel boilers, North Western Gas Board. 4.SR steam boiler, Controlled Flame Boilers, 10A, Parsons Green, London, S.W.6.

Graded gas coke is a highly efficient industrial fuel, and three appliances were selected from a large range to illustrate modern developments.

The Bigwood underfeed coke stoker permits automatic boiler operation, it being necessary only to feed fuel to the hopper and remove ashes. This unit is made in various sizes up to 1.36 m. B.t.u. per hour.

The Suxé burner is an independent, pre-boiler firing unit which can be applied to nearly every type of central heating boiler. It requires attention only twice a day and is available in sizes from 450,000 to 1.5 mill. B.t.u. per hour.

Recently introduced into this country from the Continent is the Emma boiler, suitable for hot water and low pressure steam up to 8 mill. B.t.u. per hour.

The makers are—Bigwood underfeed coke stoker, Joshua Bigwood & Son, Ltd., Wednesfield Road, Wolverhampton. Suxé burner, Suxé Combustion, Ltd., Hemel Hempstead, Herts. Redfyre Emma boiler, Newton Chambers & Co., Ltd., Thorncliffe, Sheffield.

Gas has long been established as the most suitable fuel for many heating processes in the manfacture of textiles, including gassing of yarn, singeing schreinering, embossing.

For many of the new textile processes the advantages of gas are being increasingly appreciated and more and more gas is being used for such processes as nylon setting, baking and curing, such new finishes as crease resistant, water repellent, permanent glazing and embossing, etc., and for related processes such as lamination and curing of rubber foam sheeting to textiles, carpets.

The plant used in the production of textiles is so large that it was impossible to show examples of gas usage.

Instead, a range of cloths was loaned by the Calico Printers Association, Ltd., of Oxford Street, Manchester, 1. In every case, gas had been used at some stage in their manufacture.

Fuel and Power for Industry Exhibition

THE recent Northern Exhibition of Fuel and Power for Industry was opened in the Queens Hall, Leeds, by the Parliamentary Secretary to the Ministry of Power, Mr. J. C. George, C.B.E., M.P., with the Lord Mayor of Leeds, Alderman P. A. Woodward, J.P., presiding. The Minister of Power, Mr. Richard Wood, M.P., was prevented at the last moment from coming to perform the opening himself.

Almost 60,000 sq.ft of space was packed with modern equipment for the efficient utilisation of all types of fuel.

The exhibits were presented by nearly 100 of Britain's foremost technological concerns and were arranged in about 40 stands, many of which were the equal of anything seen previously at Olympia and Earls Court.

Manufacturers took the view that this Exhibition was one of primary importance and they spared no trouble or expense to ensure that their message reached the visitors.

The Exhibition was sponsored by *The Yorkshire Post* and *The Steam Engineer*, a trade journal.

Mr. George who, in his opening speech, emphasised the importance the Government attaches to continued research and experiment into fuel conservation and economy, congratulated the organisers on their enterprise and initiative in bringing the exhibition to Leeds and in making it possible for thousands of small industrialists, as well as the representatives of major concerns, to be given a clear picture of the measures which modern science is placing at their disposal.

He said it was obvious from the displays that the manufacturers had seized the opportunity to bring out for inspection a wide range of appliances designed to give the consumer better value for the money he spent on fuel and power. Fuel efficiency was a comparatively modern term. For many years, this nation gave little heed to the thermal value it received for the money expended.

Coal was cheap and plentiful, and in the industry in which he spent most of his life—the mining industry—they were foolishly delighted by this approach to fuel problems. It allowed them to sell coal easily, at a time when it could produce enough for the country's requirements and sufficient for export.

Of course, this was a shortsighted policy. They should have realised long ago that it was the responsibility of the producer to guide his customers in the proper use of the products he sold.

They ought to have been teaching fuel efficiency, but they didn't, and it took the shortage of the war years to drive home to the coal industry and to the consumers that coal was a precious commodity which ought to be treated with respect.

The Government took steps to

acquaint the users of fuel and power of the need for higher efficiency, and the methods by which it could be obtained. In this connection, the National Industrial Fuel Efficiency Service had played, and was playing a very important part.

Times had changed. Coal was no longer cheap; indeed, it had not always been plentiful. They now realised that it was folly to use natural resources and the labour needed to produce them, wantonly and wastefully.

'Indeed, we want the cheapest therm possible from all the fuel and power industries—coal, gas, electricity and oil—and it is the Government's policy that these industries should fight for your custom in free and fair competition by the highest efficiency which science and good management can attain. But the work of the scientist must be supplemented by the development work of engineers. Some of the results are seen here to-day in a remarkable range of equipment using coal, gas, oil and electricity.

'By the ruthless elimination of old and inefficient plant, by the installation of modern equipment—such as is on show here—a significant impact upon fuel costs in industry can be made. Any reduction, of whatever magnitude, is of crucial importance in our struggle to lower our production costs.'

He added: 'I do hope that among the appliances here exhibited, many of you will find something for which you have been searching to lower your costs. There is much for you to see, to assess and apply. I am certain that this exhibition will be a success, will spread its benefits widely, and will not be the last to be held in the north.'

The North Eastern Gas Board showed a series of films on fuel utilisation and problems of heat.

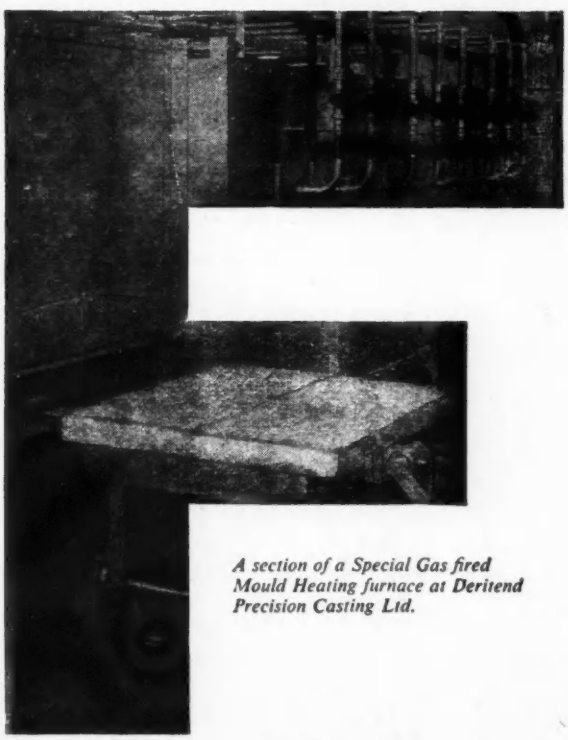
Opening this section, Mr. S. G. Deavin, Deputy Chairman of the North Eastern Gas Board, spoke of the Board's pride in its industrial heat service research and hoped that industrialists generally would make the fullest use of its facilities.

The first film was one supplied by the Gas Council, 'The heat of the matter', which dealt graphically, and in full colour, with the many varied uses of gas in a wide range of industries where precise control of heat is essential.

Mr. Deavin then introduced Mr. L. Athill, a Director of Surfard Ltd., of London, who are British agents for the Peddinghaus flame hardening machine, and who produced the film 'Peddinghaus flame hardening.' Mr. Athill gave a commentary on the film which demonstrated the use of fully automatic oxy-town gas flame hardening machines for use in the general engineering, automobile and machine tool industries.

In the afternoon an address was given by Mr. F. J. Brewer, Director and Divisional Manager of Parkinson Cowan Industrial Products Ltd., entitled 'Some uses of radiant heat in industry for heating, drying and processing'. After this refreshments were provided by the Board for their guests.

Among the exhibitors were: Bolton's Super Heater & Pipe Works Ltd., boiler plant designed for the elimination of smoke and grit. Calomax (Engineers) Ltd., patented water boilers for large or small users. Hopkinsons Ltd., boiler mountings, valves and other equipment. K.D.G. Instruments Ltd., mobile caravan with static and working models. The North Eastern Gas Board, the use of radiant heat for industry. Also additional stands showing use of gas in textile industry.



A section of a Special Gas fired Mould Heating furnace at Deritend Precision Casting Ltd.

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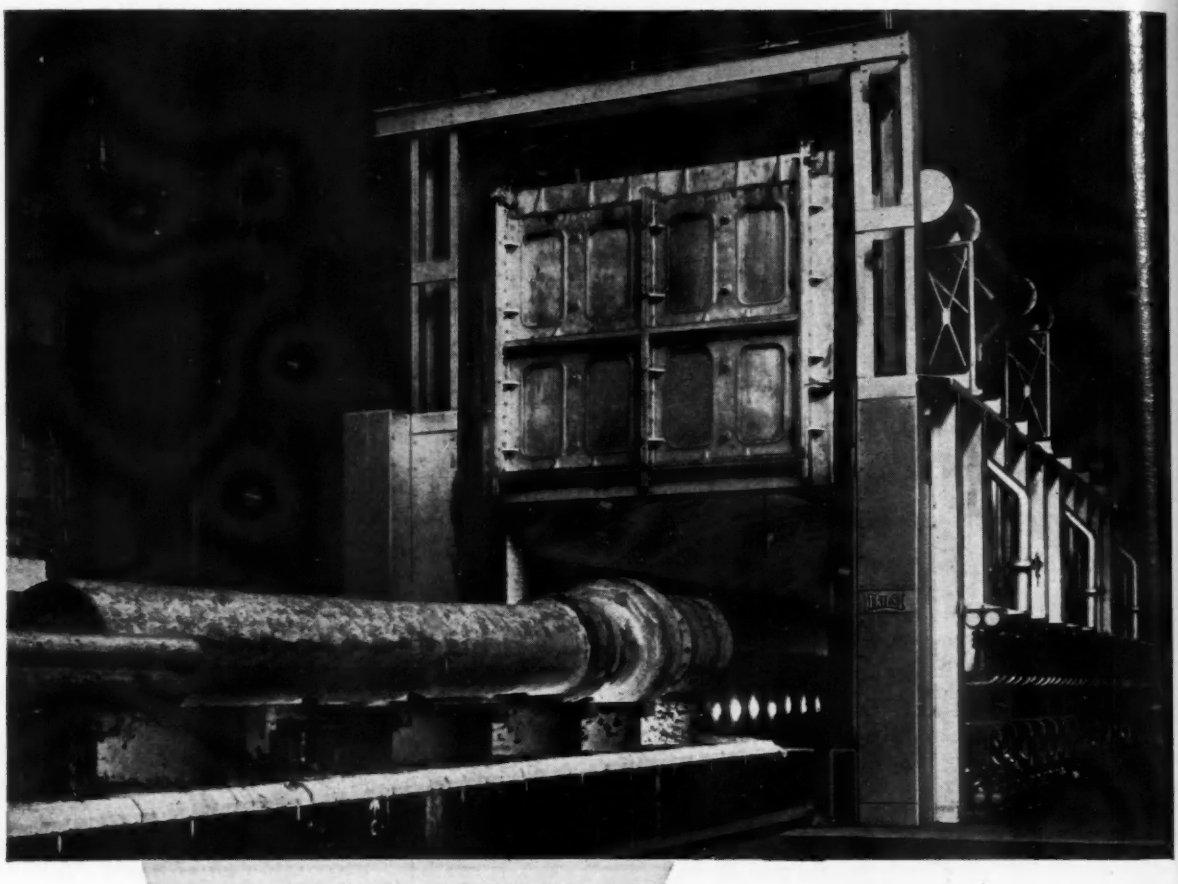

Town's Gas Fired Bogie Type Heat Treatment Furnace

The illustration shows one of a pair of Bogie Hearth Furnaces, 50 feet long by 10 feet wide, supplied to William Beardmore & Company Limited, Glasgow. Specifically designed and zoned for extended accurate heat treatment of specialised materials.

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